

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of Naofumi EZAWA

Application No.: 10/509,868

Filed: August 16, 2005

For: HEAVY DUTY PNEUMATIC TIRE

Group Art Unit: 1791

Examiner: Geoffrey L. Knable

Confirmation No.: 9791

DECLARATION UNDER 37 C.F.R. § 1.132

I, Motoaki Kanou, declare that:

I am a co-worker of Mr. Naofumi Ezawa who is the inventor of the above-captioned patent application.

I graduated from Kyoto University in 1993, and I have been employed by Bridgestone Corporation since 1993, where I have been engaged mainly in research and development of new tires.

I have made the following experiments in order to evaluate an adhesiveness between an innerliner layer and an intermediate layer (i.e., a rubber layer A) in a tire comprising a carcass layer, the innerliner layer and an inner face protection layer arranged therebetween and comprised of the rubber layer A adjacent to the innerliner layer and a rubber layer B adjacent to the carcass layer, wherein an amount of sulfur compounded satisfies the following equations (I) and (II):

$$S_A < S_B = S_C \quad \cdots (I)$$

$$2 = S_A = 2.5 \quad \cdots (II)$$

(wherein S_A , S_B and S_C are an amount of sulfur compounded in the rubber composition constituting the rubber layer A, the rubber layer B and the carcass layer, respectively, based on 100 parts by mass of the rubber component).

Experimental Procedure

(Examples A and B)

A tire for truck and bus having a tire size of 11R22.5 and a rib pattern, in which an innerliner layer is prepared according to a compounding recipe shown in the following Table A, and a rubber layer A, a rubber layer B and a carcass layer are prepared according to a compounding recipe shown in Table B, is prepared.

Table A

| | | Innerliner layer 1 | Innerliner layer 2 |
|-------------------------|---------------|--------------------|--------------------|
| Brominated butyl rubber | parts by mass | 100 | 100 |
| Carbon black N660 | | 55 | 55 |
| Stearic acid | | 1.0 | 1.0 |
| Zinc white | | 2.0 | 2.0 |
| Antioxidant DM | | 1.0 | 1.0 |
| Sulfur | | 1.6 | 0.6 |
| Sulfur content | mass% | 1.0 | 0.4 |

Table B (derived from Table 1 in the present specification)

| | | Carcass layer | Rubber layer B | Rubber layer A |
|---------------------------------|---------------|---------------|----------------|----------------|
| Natural rubber | parts by mass | 100 | 100 | 100 |
| N326 (carbon black) | | 50 | 50 | 50 |
| Cobalt compound of organic acid | | 1.5 | 1.5 | 0 |
| Zinc white | | 8 | 6 | 6 |
| Antioxidant | | 1 | 1.5 | 1.5 |
| Vulcanization accelerator | | 0.8 | 0.8 | 0.6 |
| Sulfur | | 5 | 5 | 2.5 |
| Sulfur content | mass% | 3.0 | 3.0 | 1.6 |

Then, a sample is taken from the resulting tires, and an adhesion force between the innerliner layer, and an intermediate layer (i.e., the Rubber layer A) is evaluated by conducting a peeling test according to JIS K 6256 and is shown by an index on the basis that the adhesion force in Example A is 100. The larger the index value is, the more excellent the adhesiveness is.

Table C

| | | Example A | Example B |
|---|-------|--------------------|--------------------|
| Innerliner layer used in the example | - | Innerliner layer 1 | Innerliner layer 2 |
| Sulfur content in the Innerliner layer | mass% | 1.0 | 0.4 |
| Sulfur content in the Rubber layer A | | 1.6 | 1.6 |
| Sulfur content in the Rubber layer B | | 3.0 | 3.0 |
| Sulfur content in the Carcass layer | | 3.0 | 3.0 |
| Adhesiveness between Innerliner layer and Intermediate layer (i.e., Rubber layer A) | index | 100 | 101 |

(Summary)

As seen from the above results, when the intermediate layer (the inner face protection layer) is comprised of the rubber layer A adjacent to the innerliner layer and the rubber layer B adjacent to the carcass layer and further the amounts of sulfur compounded in the rubber compositions constituting the rubber layer A, the rubber layer B or the carcass layer satisfy the above-described equations (I) and (II), the adhesiveness between the innerliner layer and the intermediate layer is high, regardless of the sulfur content in the innerliner layer. Further, even when the sulfur content in the innerliner layer is less than 0.5 % by mass, the adhesiveness between the innerliner layer and the intermediate layer is high.

I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under § 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: 2010-1-13

Declarant: Motoaki Kanou
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